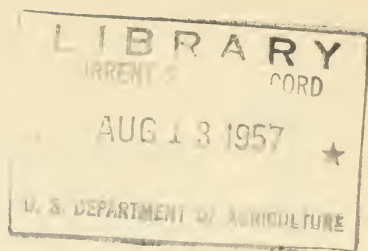


Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

.943
-763
sp. 4



MEXICAN COTTON

- PRODUCTION
- PROBLEMS
- POTENTIALS

By Frank D. Barlow, Jr.,
Foreign Agricultural Service
and Grady B. Crowe
Agricultural Research Service



Foreign Agriculture Report No. 98

Foreign Agricultural Service

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C.

July 1957

July 1957

U. S. Government Printing Office: 1957

For sale by the Superintendent of Documents,
Washington 25, D. C. Price 25 cents.

CONTENTS

	Page
Introduction	1
Main producing regions.....	3
Matamoros	5
Laguna	6
Delicias	7
Mexicali.....	9
West Coast	10
Production	14
Acreage trends.....	14
Per acre yields.....	14
Climate and soils	16
Cultural practices	16
Mechanization.....	16
Fertilization	16
Insect control	17
Agricultural resources and production potentials.....	17
Water:	
Sources of supply.....	17
Costs	19
Irrigated lands	19
Irrigation plans	20
Agricultural credit	21
Government-sponsored banks	22
Private banks and firms	22
Private individuals	23
Credit policy.....	23
Interest rates	23
Tenure system	24
Costs and returns:	
Regional variations	25
Effect of modern production technology	27
Effect of tenure system	27
Economic choice of alternative crops	28
Comparison of enterprise returns	28
Factors affecting economic choice of crops.....	30
Water supply.....	30
Capital and credit	30
Government policies	31
Other factors.....	31
Prices	32
Exports	34
Government export programs	34
Export taxes	36
Domestic consumption	38

MEXICAN COTTON

Production, Problems, Potentials

By Frank D. Barlow, Jr., Foreign Agricultural Service,
and Grady B. Crowe, Agricultural Research Service¹

INTRODUCTION

Mexico, since the revolution early in this century, has made phenomenal economic and social progress. The greatest achievements, however, have occurred in the decade following World War II. There is every reason to believe that the country under sound leadership is destined to move on to a more complete utilization of its resources, and to a higher standard of living for its people.

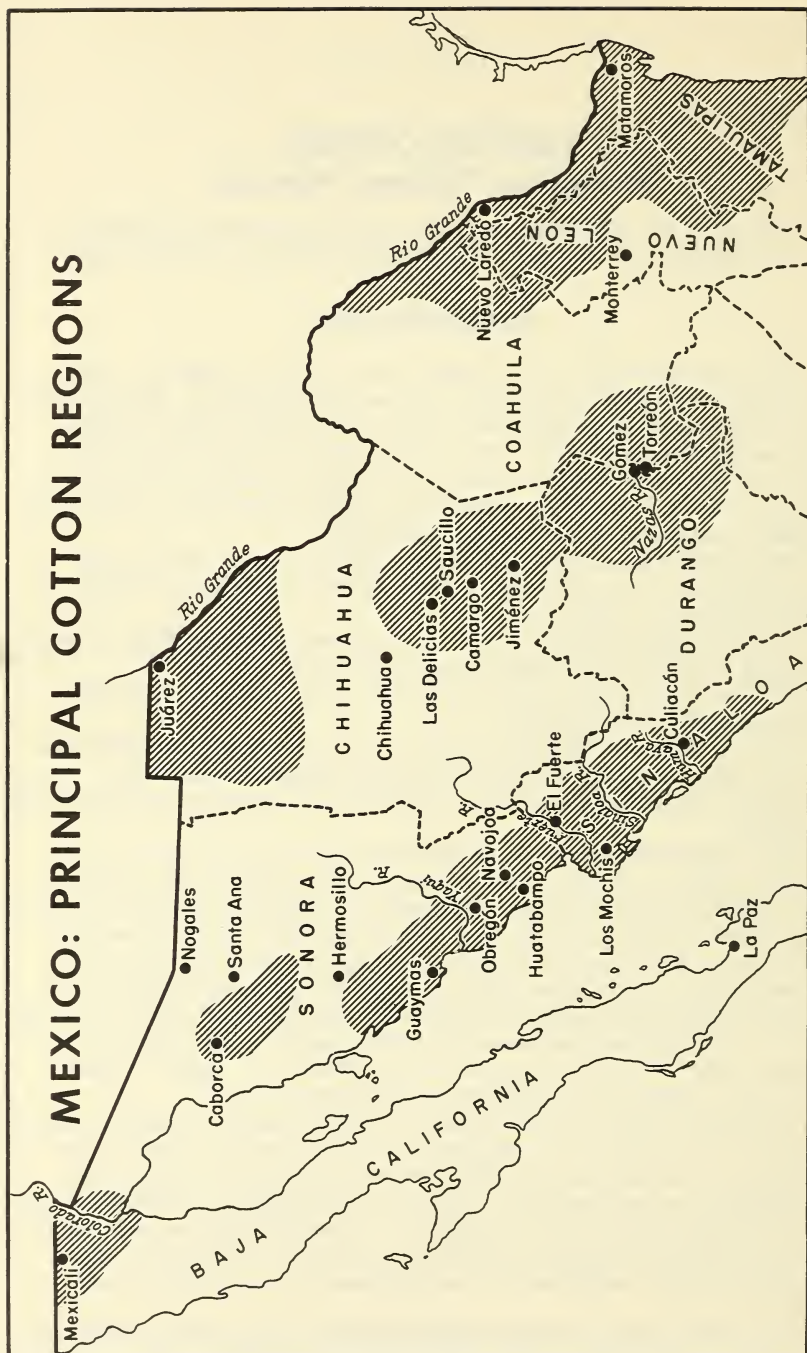
Four important related factors have contributed to the snowballing economic and social growth of Mexico since World War II. They are--

- (1) The large dollar reserves accumulated by Mexico during and immediately after World War II;
- (2) The ever increasing flow of tourist dollars from the United States to Mexico;
- (3) The flow of Mexican workers ("braceros") across the border for agricultural work in the United States; and
- (4) The development and expansion of cotton production and exports.

The capital reserves available to Mexico for financing large-scale economic development after World War II gave the country the economic strength it needed to move forward. Tourism, the braceros, and cotton exports have provided continuing sources of dollar earnings to keep the economic development activities rolling. The building and improvement of highways and railroads and the general improvement of all communications have aided greatly in opening up new areas--one of the major factors in Mexico's unparalleled economic and social growth since World War II.

Tourism is the major source of the country's dollar earnings, but the dollars brought or mailed back to Mexico annually by the 300,000 to 500,000 returning braceros defy statistical measurement. The lack of adequate statistics on this dollar source contributes to a chronic underestimation of the country's dollar earning capacity. Frequently, the braceros are referred to as Mexico's most important

¹ Mr. Barlow is Chief, Foreign Competition Branch, Cotton Division, FAS; Mr. Crowe is Agricultural Economist, Farm Economics Research Division, ARS.



agricultural export. Add the dollar exchange earned from cotton exports, and the overwhelming importance of these three factors in the Mexican economy can be fully appreciated.

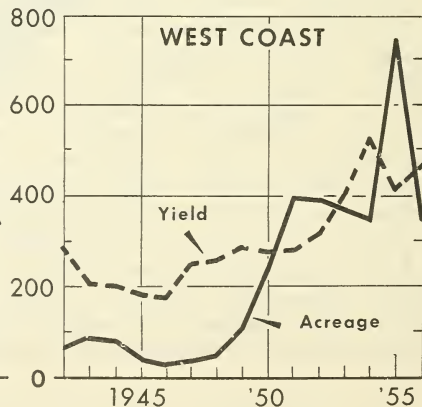
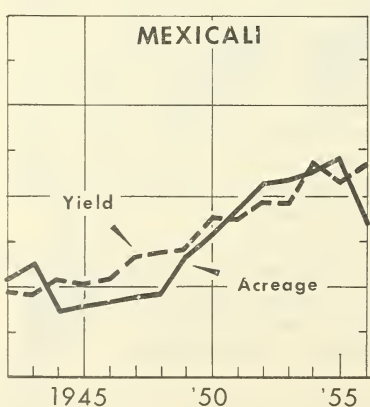
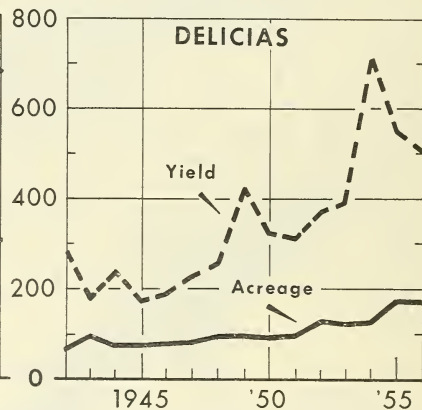
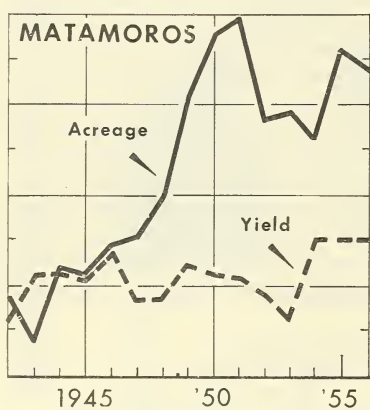
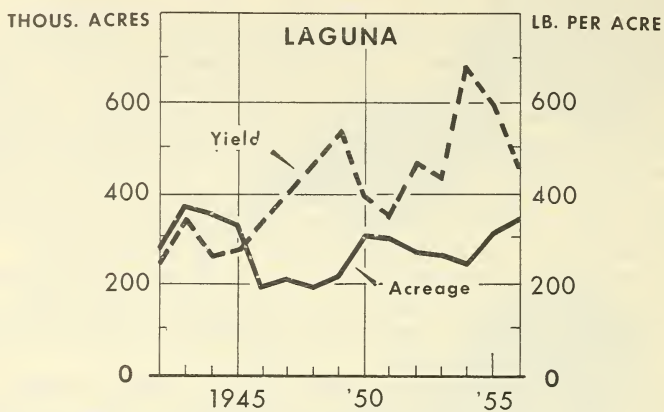
Perhaps even more important than dollar exchange is something else brought back by the braceros--technical know-how in agriculture, on an unprecedented scale. The bracero, who learned the arts of a highly technical agriculture in the United States and returned to apply them in Mexico, ranks with any other single factor contributing to Mexico's meteoric growth as a cotton producing country. Capital was important in providing the processing and marketing facilities and in financing the crop. Selling the crop in international markets was important, too. But the efficient worker trained in handling highly complex farm machinery, irrigation, fertilization, insect control, and other advanced cultural practices was a necessity to the successful growth of Mexico's cotton economy.

Nor can the importance of cotton to the nation's economy be minimized. The export value of Mexican cotton exports in the 1955-56 season totaled more than \$200 million. Cotton is not only the life blood of the communities in which it is grown; it is a major source of income to the Government. For example, of the total income accruing from the production of raw cotton in the 1955 season, the people engaged in its production and processing received more than \$150 million while approximately 25 percent of the gross value of the crop exported, or approximately \$50 million, represented income to the Government. In 1956, about 17 percent of the gross value of cotton exports, or nearly \$25 million, accrued to the Government through the imposition of cotton export taxes.

MAIN PRODUCING REGIONS

Mexico's cotton lands are located in the northern areas of the country. The five major regions are Matamoros; the Laguna around Torreón; Delicias; Mexicali; and the West Coast areas in the States of Sonora and Sinaloa. In addition, there are smaller areas around Juárez, Don Martin, La Paz, Nuevo Laredo, Monterrey, and others. Virtually all the important cotton areas are located in river valleys and old lake beds where water is available. With annual rainfall ranging from practically nothing up to only 10 or 15 inches annually, irrigation is a necessity for practically all commercial agricultural production. About the only rain-grown cotton in Mexico is found in a small district of about 75,000 acres in the Matamoros region, and even in this area dry-land farming is an extremely hazardous undertaking.

COTTON ACREAGE AND YIELD in Mexico's 5 principal cotton regions



Matamoros

Matamoros, one of the oldest cotton regions in Mexico and currently the largest in terms of acreage and production, lies directly across the river from the lower Rio Grande Valley of Texas. The area has developed rapidly in the last decade; it produced a record crop of 454,000 bales in 1955. In 1956, a crop of 422,000 bales was harvested from 672,000 acres, with a yield of 301 pounds an acre. Yields have increased significantly, but are highly variable because of erratic irrigation, water supplies, and the fact that on some 75,000 acres cotton is rain-grown.

Since rainfall in Matamoros is usually light, the bulk of the cotton is grown under irrigation. Irrigation water for the region comes from the reservoirs of two dams and from a few wells near the Rio Grande river. The Marte Gómez Dam, at full capacity, irrigates about 173,000 acres. Mexico's share of the water from the Falcon Dam on the Rio Grande, at capacity, irrigates approximately 445,000 acres. These two systems are normally supposed to furnish three irrigations per season to supplement the scant rainfall. The few wells supply only a very small part of total water requirements for the region. Potential development of deep wells is small because of the high mineral content of the sub-surface water.

For 1957, water supplies in the two large reservoirs are critical. In February 1957, the Marte Gómez Dam could supply only two irrigations to 45,000 acres, not much more than one-fourth of the area normally serviced by this dam. Mexico's share of the water from the Falcon reservoir for 1957 will furnish only one irrigation to 345,000 acres. Plans call for the use of this single irrigation at the most strategic time. Luckily, the region had exceedingly heavy rains early in March. This meant that planting could proceed without irrigation, and the water in the dams can be saved until it is most needed. If another rain occurs during the growing season and if the timing of the one available irrigation is correct, Matamoros can produce a crop comparable to those of the last few years. However, the prospect of timely rainfall during the growing season in this area is unpredictable. In 1956, only about 35,000 bales were produced strictly as rain-grown cotton. Dryland cotton production usually results in very low yields and is extremely hazardous.

Cotton production costs are relatively low in the Matamoros region compared with other regions in the country. Excluding land, management, and interest charges, costs range from roughly \$40.00 per acre, on small farms where inputs are kept low, up to about \$90.00 per acre on farms where technology and modern practices are applied.

In terms of competition for productive resources, cotton has practically no alternatives in Matamoros. Sorghums and small grains grow well in the region, but lack of markets is a serious handicap to their production. Some work has been done with sesame, but yields have been extremely variable. At present, the crop is of no economic significance in the agricultural pattern, but some 3,500 to 4,000 acres are being planted by 700 to 800 farmers in the coming year to see if sesame can be expanded on a commercial scale.

With the present critical outlook for water, considered estimates by informed local people place 1957 cotton production at between 300,000 and 375,000 bales. Favorable rains coming at the right time later during the growing season could raise this production to 400,000 bales, or near the average of the last 5 years.

In the next 5 to 10 years, if water supplies are ample and if the trend to improved production practices continues, Matamoros could raise its production potential to some 500,000 bales annually. However, barring the development of new irrigation facilities, this would perhaps represent the norm for Matamoros. Stability of production and prices will have a great influence on the rate at which improved practices will be adopted. Since greater stability of production in this area is tied to stability in water supplies, the prospects for the rapid adoption of modern cotton production techniques are not optimistic.

Laguna

The Laguna region, for years the leading cotton region of Mexico, is located in the north central part of the country about 385 air miles west of Brownsville, Texas. It lies in the States of Coahuila and Durango and surrounds the two cities of Torreón and Gómez. Although acreage and production have increased moderately in recent years, the region now ranks fourth in the country in volume of cotton production. Peak production was reached in 1955 with a crop of 396,000 bales; the 1956 crop was 327,000.

Irrigation water for the region comes from both gravity sources and deep wells. The reservoir formed by the Lázaro Cárdenas (Palmito) Dam on the Nazas River furnishes gravity water for roughly 250,000 acres when filled to capacity; but at present, it has only enough water to irrigate about 25,000 acres in 1957. Prospects for improvement in the water supplies in the near future are considered poor.

In addition to the acreage irrigated by gravity water, more than 250,000 acres are irrigated from some 3,200 deep wells. Most of the area is restricted for the drilling of new wells; however, some free drilling of wells continues along the periphery of the restricted zone. Since it has been necessary to drill deeper each year for water (400 feet 5 to 8 years ago;

up to 1,000 feet at present), proposals have been advanced to restrict the drilling of new wells for the entire region. This will have a considerable braking effect on future expansion possibilities.

In general, costs on typical farms vary from \$100 to \$130 per acre, excluding charges for land, management, and interest. However, some farms on which technology is well advanced and production practices highly intensified have production costs ranging up to \$200 and even \$250 per acre (excluding land, management, and interest). On these farms, yields compare favorably with those in any of the high-yielding areas of the world; yields in excess of 4 bales per acre have been reported. In general, technology is moving into the region rapidly and production methods are modern. Especially is this true on the large, privately operated farms.

In Laguna cotton has no strong competitor for productive resources, based on net returns per acre. However, agriculture is fairly well diversified. In addition to cotton, wheat and other small grains, alfalfa, corn, grapes, and vegetables are produced. By and large, this diversification results from planned rotations and balanced cropping systems rather than returns per acre. Farmers in this area are conscious of the benefits that might be gained by following planned rotations and the use of winter cover crops.

Owing to the critical water situation, the acreage planted to wheat in 1957 will be reduced considerably from the 115,000 acres of 1956, both in the area supplied by water from the dam and on farms irrigated by wells. The outlook for cotton production in 1957 appears to be somewhere between 290,000 and 300,000 bales. Over the next few years, the region might be expected to reach a production norm of 375,000 to 380,000 bales provided there is improvement in gravity water supplies.

Delicias

Delicias, one of the newer cotton regions of Mexico, is located about 50 miles southeast of the city of Chihuahua in the State of Chihuahua about 265 air miles south of El Paso, Texas. The Delicias region, as referred to in this report, includes all of the cotton areas around the city of Las Delicias, including Ceballos, Saucillo, Camargo, Jiménez, Meoqui, and other small adjacent areas.

Cotton production has tripled since 1950, increasing from 61,000 bales to 98,000 bales in 1952, and to 197,000 bales in 1955. Although acreages have doubled in the last decade, most of the increased production has resulted from higher yields. The average yield was 308 pounds per acre in 1947-51; it rose to 588 pounds in the 3-year period 1954-56. Production in 1956 was approximately 179,000 bales.

Gravity water for irrigation comes from two dams--La Baguilla and Francisco I. Madero (Las Virgenes). These dams, at capacity, will irrigate roughly 155,000 acres. At present, the water in the two reservoirs is sufficient to irrigate the entire system for 1957. However, this would leave no water reserves for 1958, and the long-range weather outlook is very poor for replenishing supplies in the reservoirs by that time.

In addition to the gravity sources, water for irrigation is supplied by deep wells. This is true both inside and outside the irrigation district that is supplied by water from the two dams. New wells and more efficient use of water can partly offset the shortage in gravity water supplies. The area irrigated annually by water from the large reservoirs has ranged from 120,000 to 150,000 acres over the past 10 or 12 years.

Considerable acreage was planted to wheat in the deep-well district around Jiménez in 1956, but experience proved wheat to be not nearly so profitable as cotton. As a result, some 25,000 to 30,000 acres that were planted to wheat in 1956 will probably be shifted back to cotton in 1957. This will more than offset the reduction in cotton acreage that might result from shortages of gravity water supplies.

Cotton production costs, excluding charges for land, management, and interest, vary widely, ranging from about \$65.00 to \$130.00 per acre. Production costs on small farms are among the lowest in Mexico, excepting Matamoros. These farms have low levels of inputs and low water costs. Costs are somewhat higher on the large private farms, where the levels of inputs have been stepped up and where much of the water for irrigation is supplied by deep wells. Yield per acre of course is higher on farms using the more intensive production practices.

Cotton has no serious competition from other crops for the use of land or other productive resources in Delicias. Shifts that have been made from cotton to wheat have been temporary. Small acreages of alfalfa, peanuts, corn, and grapes are also grown in Delicias, but cotton accounts for roughly 95 percent of the total value of agricultural production in the region. The shift of 25,000 to 30,000 acres from wheat back to cotton in 1957 is indicative of cotton's strong competitive position in the agricultural pattern of the area.

With the present outlook for water, considered estimates of cotton production for Delicias in 1957 are from 175,000 to 200,000 bales. With additional wells and more efficient utilization of water, production in the next 5 to 10 years will probably level off at a norm of about 200,000 bales. Significant application of modern production technology could conceivably push cotton production even higher. The area has an excellent reputation for stability in production primarily because of the dependability of gravity water supplies.

Mexicali

Mexicali, one of the most important cotton regions in Mexico, lies directly across the border south of Calexico, Calif., and is the southern tip of the Imperial Valley. Cotton acreage has increased rapidly in the past few years, reaching a peak of 482,000 acres in 1955. Peak production was reached in 1954 with a crop of 442,000 bales. With the increased use of fertilizers and insecticides, yields have continued to improve. Averaging 305 pounds for the 1947-51 period, yields rose to an average of 427 pounds in the 5-year period 1952-56. With minimum water allotments from gravity supplies in 1956, a crop of about 325,000 bales was harvested from 338,000 acres.

The Mexicali Valley receives most of its irrigation water from the Colorado River. Under terms of the present treaty with the United States, Mexico receives 1,500,000 acre feet of water when supplies are low, 1,700,000 acre feet when supplies are normal, and 1,878,000 acre feet when there is ample supply in Boulder Dam. Present prospects indicate that the same situation will exist in 1957 as in 1956 and Mexico will receive the minimum amount of water, which will irrigate adequately about 335,000 acres. To supplement the gravity water there are over 460 deep wells in the area. Over 100 wells in the planning stages will be brought into production as quickly as possible. All together, the wells will provide an additional 1,000,000 acre feet of water, which would irrigate roughly 225,000 acres of cotton. The district has something over 600,000 acres in cultivation, so its water supply, even with both gravity and well sources, will still be short of what would be termed desirable.

The Mexicali region is troubled by salt accumulations in the soil due to inadequate irrigation water and poor drainage. This problem must be overcome to keep much of the land in continuous crop production. Improvement of the drainage system is the most important thing needed to increase the agricultural production potential of the region.

In general, costs in Mexicali, excluding charges for land, management, and interest, are fairly high, ranging from \$80 to \$150 per acre depending on water costs, scale of operation, and level of inputs. Much of the cotton in the area is grown on small farms where the level of inputs and production costs are nearer the lower end of the range.

Although many other crops are grown in the Mexicali region, none offers any serious competition to cotton for productive resources. Vegetables and melons thrive in the area, but markets are limited and transportation is difficult. Lack of markets also limits barley production. Rust has plagued the production of wheat, and farmers hesitate to expand acreage. Some alfalfa is grown; expansion of alfalfa production would create a serious marketing problem.

The current land use picture is about as follows: Cotton 96 percent, small grains 2 percent, alfalfa 1 percent, and miscellaneous crops 1 percent.

In view of the present water situation, informed local people expect a crop of about 380,000 bales of cotton in 1957. However, given improved production practices, the development of an adequate drainage system, and the easing of water shortages, Mexicali's cotton production potential is likely to reach a half-million bales in the next 5 to 10 years.

West Coast

The West Coast of Mexico, including the two States of Sinaloa and Sonora, is one of the most rapidly developing agricultural regions of the world. A decade ago agricultural development of these two States was relatively unimportant. Over the last 5 years significant developments in irrigation and the immigration of agricultural workers have made it the country's garden spot.

People have come to the West Coast agricultural regions from all over Mexico; and the two newest agricultural regions, Obregón and Los Mochis, have become modern-day boom towns. It is in this area that Mexico has increased its economic base to raise its food and fiber production potential. It is in this area that future agricultural production expansion is expected. And it is in this area that in time Mexico should gain the economic resilience to achieve self-sufficiency in wheat and to offset the short cotton crops that may occur periodically in the other four major cotton regions because of inadequate water. Water--coming from the reservoirs on the Yaqui River, which supplies the Obregón district, and the Fuerte River, which supplies the area around Los Mochis--is more plentiful on the West Coast than anywhere else in northern Mexico.

The reservoirs supplying the Navojoa-Huatabampo and Hermosillo areas are not as adequate as those in Obregón and Los Mochis. Hermosillo is primarily a deep-well area, as is Caborca. Several other minor areas such as the Guaymas Valley and the area around Santa Ana have recently caught the eye of investors, and considerable progress has occurred during the last few years in drilling deep wells for irrigation. Enthusiasm for new developments has dwindled somewhat in these areas, with the outlook for cotton prices 25 percent below those existing in 1954.

Culiacán is the southernmost area along the West Coast where cotton is grown commercially. After a number of years with no set planting dates or rotations, Culiacán had serious difficulties with high insect infestations. Finally, in 1956, the government ordered all cotton production suspended, in an effort to reduce insect infestations and to create some order in the cotton-growing system. Despite production

problems, cotton has been one of the highest value crops grown in the area. For example, the gross returns for cotton averaged \$77.75 per acre in 1953-54, exceeding the gross returns from such crops as sugarcane, with \$34.80 per acre; rice, with \$34.70; frijoles, with \$39.36; wheat, with \$43.02; chick peas, with \$65.77; milo, with \$29.64; and maize, with \$19.41. Only tomatoes, with a gross income of \$155.90 per acre, and chili peppers for export, valued at \$210.59 per acre, exceeded the gross per acre returns from cotton.² After a year of suspended cotton production in 1956, farmers in this area were expected to plant from 30,000 to 35,000 acres as a winter crop. The harvest in early 1957 is expected to range between 25,000 and 35,000 bales.

Approximately 2 million acres are now under irrigation on the West Coast from Caborca-Pitiquito in Sonora to Culiacán in Sinaloa. Estimated area in major districts where cotton is grown is as follows:

Valley or irrigation system	Land available for crops by 1957
	<i>Acres</i>
Caborca-Pitiquito.....	86,485
Hermosillo.....	234,745
Santa Ana.....	12,355
Guaymas.....	24,710
Obregón.....	543,620
Navojoa-Huatabampo.....	197,680
El Fuerte.....	568,330
Culiacán.....	<u>234,745</u>
Total, West Coast cotton areas.....	1,902,670

Little or no further land development is anticipated in Caborca, Hermosillo, or Navojoa-Huatabampo. Some expansion is considered feasible in the Guaymas and Santa Ana areas, but there are no firm estimates of the probable time schedule or the acreages that new wells might add. The major possibilities for expanding the existing projects lie in the El Fuerte Valley, which has another 420,070 acres suitable for crop production, plus ample gravity water; in Culiacán, where it is estimated that the cropland area can be doubled or even tripled with the completion of a second dam; and in Obregon, where an additional 75,000 acres of reasonably good land can be brought under irrigation with the development of deep wells. The El Fuerte and Obregón developments rank first as potential cotton land, but the future price and income relationships between cotton and wheat and other crops will determine how the land will be used.

² Report of the Secretaría de Recursos Hidráulicos, Distro de Riego No. 10, Rio Culiacán, Mexico. 1954.

The dynamics of West Coast land development are great, and the existing cropping pattern has been subject to wide shifts between cotton and wheat in the early stages of the region's development. Table 1 shows the somewhat erratic trends of cotton acreage, production, and yield in the West Coast areas over the past 3 years.

The significant expansion of cotton production in the West Coast region in 1955, coupled with a record crop in the other four cotton regions, led to a record-breaking Mexican crop of 2.2 million bales in that year. But the anxiety that Mexican producers felt for the first time in 1955 over world cotton price declines, the inadequacy of production credit, and the drive for self-sufficiency in wheat which was backed up by favorable government support prices, caused serious curtailment in cotton production on the West Coast in 1956. Also, the record cotton crop of 1955 had given producers the impression that facilities for handling a 600,000-bale crop were inadequate. Whether this was true is debatable, but unusually heavy seasonal rainfall in the early autumn of 1956, followed by the Gulf Coast hurricane that crossed the mountains during the harvesting season, left an impression that will take several years to erase. According to experienced cotton leaders on the West Coast, these factors resulted in an overemphasis on acreage reduction in 1956, to the detriment of the region's total agricultural income--especially in Obregón.

The outlook is good, and though many production and marketing problems are still to be faced, it is believed that West Coast cotton production will turn back up in 1957 to reach a total of 450,000 to 475,000 bales. The upward trend is expected to continue over a number of years, carrying the West Coast region as a whole to a production of approximately three-quarters of a million bales. A gradual upward trend of 50,000 to 60,000 bales a year would give time to improve and expand the facilities for handling the cotton crop and to solve production problems, as well as to provide a much sounder basis for developing an efficient and profitable cotton enterprise. Overexpansion in a particular year, especially if unusual circumstances should arise as they did in 1955, probably would delay the full attainment of this region's potential.

As the new lands are developed in El Fuerte and Obregón, the land base for cotton will increase. It is not so important that the actual planting take place around Los Mochis or Obregón. The development of farming systems and experience over the next few years will determine this. If wheat proves more stable in El Fuerte, cotton may gravitate toward Obregón. If the competitive relationships between cotton and wheat remain about the same in each of these areas as they are now, cotton will likely be a major crop in both areas. But the most important consideration of all is

TABLE 1.--Cotton: Estimated acreage, yield, and production in West Coast regions of Mexico, by areas, 1954-56

State and irrigation system	1954			1955			1956		
	Acreage	Pro-duction	Yield per acre	Acreage	Pro-duction	Yield per acre	Acreage	Pro-duction	Yield per acre
Sinaloa:	1,000 acres	1,000 bales	Pounds	1,000 acres	1,000 bales	Pounds	1,000 acres	1,000 bales	Pounds
Culiacán...	65,000	43,000	318	124,000	65,000	252	--	--	--
El Fuerte..	54,000	38,000	338	117,000	78,000	320	61,000	56,000	441
Total.....	119,000	81,000	327	241,000	143,000	285	61,000	56,000	441
Sonora:									
Navojoa-									
Huatabampo	32,000	34,000	510	57,000	62,000	522	39,000	39,000	480
Obregón....	124,000	133,000	515	233,000	210,000	433	79,000	90,000	547
Guaymas....	--	--	--	10,000	9,000	432	8,000	7,000	420
Hermosillo.	75,000	86,000	550	135,000	140,000	498	74,000	76,000	493
Santa Ana..	12,000	8,000	320	13,000	11,000	406	10,000	6,000	288
Pitiquito-									
Caborca...	69,000	41,000	285	60,000	65,000	520	79,000	56,000	340
Total.....	312,000	302,000	465	508,000	497,000	470	289,000	274,000	455
Grand									
Total.....	431,000	383,000	427	749,000	640,000	410	350,000	330,000	453

that the country is now producing its full requirements of wheat. It is therefore inevitable that the upward trend in wheat production will be arrested, and that economic pressures will favor cotton, a crop of much higher value and greater profits.

PRODUCTION

Mexican cotton production has grown tremendously in the past 10 years (see table 2). Production increased from approximately 317,000 bales a year in 1934-38 to an average of nearly 600,000 bales in the first 5 postwar years. It rose to a peak of 2.2 million bales in 1955, but dropped off severely by a half-million bales in 1956 because of a 46-percent reduction in acreage in the States of Sonora and Sinaloa. Production in 1957 is not expected to rise more than 100,000 to 200,000 bales above the 1.7 million bales produced in 1956, but the outlook over the next 4 or 5 years is that it will push ahead slowly and reach a norm somewhat above the 1955 level.

The upward trend in Mexico's cotton production has made that country the second largest exporter of cotton in the world. It has surpassed both Egypt and Brazil for the past 2 years and now ranks second only to the United States. Mexico is expected to hold this position in the foreseeable future.

Acreage Trends

The area planted to cotton has expanded threefold, from less than 700,000 acres during 1934-38 to around 2 million in 1956. This expansion, which provided the base for increasing the country's cotton production potential, resulted from the construction of huge dams, the drilling of deep wells, and the development of irrigation districts. The greatest acreage increase occurred after 1948, as irrigation projects that had been under way for a number of years began to reach completion.

Per Acre Yields

More abundant and more reliable sources of water and the use of improved production practices have brought progressive increases in cotton yields. Yields have increased from an average of 204 pounds per acre in the 1934-38 period to 423 pounds in the most recent 3-year period 1954-56. The increase in per acre yields has averaged over 14 pounds annually. There is every indication that Mexican cotton growers will continue to adopt improved production practices and that yields will continue to increase even at present prices. If prices were to rise 25 percent to levels comparable with those just before 1955, improved technology would probably be adopted at an even faster rate. On the other hand, a drop

TABLE 2.--Cotton: Acreage, yield, and production in Mexico, by regions, average 1934-38, annual 1939-56

Acreage									
Year beginning August	Mata-moros	Mexi-calif	Sonora-Sinaloa	Laguna	De-licias	Juárez	Don Martin	Others	Total
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Average: 1934-38 ¹	--	--	--	--	--	--	--	--	680
Annual:									
1939 ¹	--	--	--	--	--	--	--	--	648
1940 ¹	--	--	--	--	--	--	--	--	627
1941 ¹	--	--	--	--	--	--	--	--	781
1942.....	173	208	60	271	62	57	35	29	895
1943.....	72	250	87	374	96	53	48	30	1,010
1944.....	237	141	79	354	73	39	15	25	963
1945.....	227	153	37	331	72	33	39	12	904
1946.....	284	168	25	193	74	45	32	22	843
1947.....	309	176	39	208	79	49	42	25	927
1948.....	395	185	49	198	99	50	49	25	1,050
1949.....	618	264	104	213	99	44	42	62	1,446
1950.....	755	310	238	301	90	65	72	49	1,880
1951.....	796	371	399	299	94	79	77	68	2,183
1952.....	560	425	395	268	125	52	23	89	1,937
1953.....	580	433	370	260	121	50	2	44	1,860
1954.....	525	450	350	246	125	35	17	72	1,820
1955.....	725	482	749	319	174	46	37	164	2,696
1956 ²	672	338	348	346	171	58	16	89	2,038
Yield per acre									
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Average: 1934-38 ¹	--	--	--	--	--	--	--	--	204
Annual:									
1939 ¹	--	--	--	--	--	--	--	--	230
1940 ¹	--	--	--	--	--	--	--	--	230
1941 ¹	--	--	--	--	--	--	--	--	230
1942.....	119	188	287	245	278	235	232	132	245
1943.....	219	182	203	343	174	216	149	127	244
1944.....	220	210	200	265	236	282	191	134	234
1945.....	208	203	181	277	173	203	245	159	229
1946.....	275	217	173	341	188	288	225	87	262
1947.....	169	265	246	399	225	274	194	58	251
1948.....	170	272	255	465	257	259	216	96	261
1949.....	245	280	282	539	422	415	286	132	311
1950.....	226	351	276	399	325	347	280	313	294
1951.....	215	348	279	353	311	310	268	289	280
1952.....	183	385	314	466	376	332	209	183	310
1953.....	121	384	400	439	392	250	240	229	312
1954.....	301	471	525	673	718	507	367	293	469
1955.....	301	426	410	596	543	355	117	272	401
1956 ²	301	470	463	454	502	314	300	372	403
Production ³									
	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales
Average: 1934-38 ¹	--	--	--	--	--	--	--	--	317
Annual:									
1939 ¹	--	--	--	--	--	--	--	--	312
1940 ¹	--	--	--	--	--	--	--	--	302
1941 ¹	--	--	--	--	--	--	--	--	375
1942.....	43	82	36	208	36	28	17	8	458
1943.....	33	95	37	268	35	24	15	8	515
1944.....	109	62	33	196	36	23	6	7	472
1945.....	99	65	14	192	26	14	20	4	434
1946.....	163	76	9	137	29	27	15	4	460
1947.....	109	97	20	173	37	28	17	3	484
1948.....	140	105	26	192	53	27	22	5	570
1949.....	316	154	61	239	87	38	25	17	937
1950.....	355	227	137	250	61	47	42	32	1,151
1951.....	300	269	232	220	61	51	43	41	1,273
1952.....	213	341	258	260	98	36	10	34	1,250
1953.....	146	346	308	238	124	26	1	21	1,210
1954.....	329	442	383	345	187	37	13	44	1,780
1955.....	454	428	640	396	197	34	9	93	2,251
1956 ²	422	331	336	327	179	38	10	69	1,712

¹ Regional breakdown not available.² Preliminary.³ 1934-45, bales of 478 pounds; 1946 to date, bales of 480 pounds.

in prices below current levels would seriously retard the adoption of modern technology in cotton production and slow the upward trend in per acre yields.

Climate and Soils

Climatic factors other than rainfall favor the production of cotton in Northern Mexico. Growing seasons are usually long, being well over the desired 210 days required for optimum cotton production. The hot dry weather aids insect control. Rainfall varies widely. It averages only about 3 inches a year in Mexicali; ranges between 3 and 8 inches in the North Central border regions; and varies upward from 8-15 inches in the State of Sonora to 30 inches in Southern Sinaloa. Only in Sinaloa does relatively high humidity occur during the late growing season. This affects cotton production unfavorably, but this situation causes greater concern to cotton specialists whose experience has been limited to production in the arid irrigated areas than it does to specialists from humid, rain-grown cotton areas.

In general, soils in the cotton regions are good and respond favorably to fertilization and crop rotation.

Cultural Practices

Mechanization. --Cultural methods and production practices have undergone radical changes in Mexico during the last decade. Modern power and equipment have replaced the traditional "man with the hoe," particularly in land preparation and cultivation.

Firms handling United States production machinery and equipment do a thriving business in all the cotton areas of Mexico. Production techniques now more and more include power and equipment and resemble those used in the southwestern and western irrigated areas of the United States. Even the ejidos³ financed by the Banco Ejidal and the small independent farms financed by the Banco Agrícola take advantage of mechanization. The banks buy heavy equipment and provide for its use by groups of small farmers. In addition, many small farmers with less than 50 acres now own their own tractors, especially in the more stable cotton region and in areas where cotton has been extremely profitable for a number of years.

The trend toward mechanization has resulted in better seed-bed preparation and better irrigation and drainage, and thus has contributed to higher yields.

Fertilization. --Until recently soil fertility received little consideration. But an integral part of the new production methods is the increased use of fertilizers. This has brought favorable results, even though many farmers have applied

³ See p. 24.

fertilizer on a hit-or-miss basis because they had insufficient information on the deficiencies of their soil and on the responses they could expect from particular fertilizer formulas.

Up until now the sales efforts of commercial firms have given impetus to the increased use of fertilizers in the various areas, but these firms are often forced to supply the credit necessary to finance their sales.

Reliable information on the correct use of fertilizers is seriously needed. In recent years, the Ministry of Agriculture has started experimental investigations in fertilizer responses. The Ministry has just completed experiment stations in Laguna, Delicias, Obregón, and Matamoros, and is making progress toward developing local experiment stations in other cotton regions. It is setting up new fertilizer-study programs at these new stations along with expanded programs at the older ones. These studies will go far toward developing a sound pattern for the effective use of fertilizers as well as increasing the economic level of fertilizer inputs in cotton production.

Insect Control. --The problem of choosing and applying the various new insecticides is just as serious as the lack of knowledge in the use of commercial fertilizers. Mexico is plagued with most of the common insects associated with cotton production. In recent years, insecticide firms have been active in all regions of the country, and considerable acreages have been treated with insecticides. Practically all use of insecticides up to now has been based on results of experiments conducted in the United States. However, the expanded research programs of local experiment stations will include work on the use and effectiveness of insecticides in Mexico and should do much to help improve insect control.

The insecticide firms finance the sale of insecticides much as the fertilizer companies do. They must rely heavily upon the integrity of the individual producers, for their lien is usually secondary to that of the primary factors extending credit to finance the crop.

AGRICULTURAL RESOURCES AND PRODUCTION POTENTIALS

Water

Sources of supply. --Water is the most important single factor affecting production in Mexico's cotton regions. Rainfall is low and unpredictable, and to produce crops of any consequence in Northern Mexico requires irrigation.

The irrigation developments that began in 1925 and the large-scale projects completed in the last decade have revolutionized Mexican agriculture. Most of the country's irrigation water comes from large federal projects involving

large dams and storage reservoirs and extensive canals and drainage ditches. These gravity sources supply some 70 percent of the water used in cotton production. These sources, too, are the ones worst affected by the serious droughts that periodically plague the country. Many of the large federal dams also provide hydroelectric power.

The rest of the irrigation water comes from wells, both deep and shallow. Usually located next to rivers and old riverbeds, wells range in depth from about 300 to 600 feet; however, in the interior regions and in areas away from riverbeds, it is sometimes necessary to drill 700 to 1,000 feet for water. The pumping depth ranges from 60-120 feet in areas such as Mexicali and Hermosillo up to 160-200 feet in Laguna.

Water tables are declining because of heavy usage and sustained drought. This decline in areas such as Laguna has caused the Ministry of Hydraulic Resources to put restrictions on the drilling of new wells. No one can drill a new well without a permit from the Ministry. Usually, however, individuals can obtain permits to replace wells that have stopped producing.

The Ministry of Hydraulic Resources is becoming more active in drilling wells to supplement gravity water supplies, especially in Mexicali. The Ministry's policy is to discourage private development in the large irrigation districts in favor of public development. This policy is designed to insure more equitable allocation among individuals, along socialistic lines, but the Ministry's recent decision to permit the construction of 100 new wells by private firms indicates that its policy in this connection has not yet become too rigid.

Public development of wells is likely to result in more inefficient use of ground water supplies. The water is usually pumped into the main lateral canals before it is carried to the individual users. Since it travels farther than water coming from private wells, naturally the loss from evaporation and absorption is greater. Private wells on individual farms are usually located so as to take the greatest advantage of the terrain and make the most efficient use of water. Restricting private development in favor of public development also cuts off one of Mexico's few sources of venture capital for agriculture.

Since supplies are now low in 4 out of the 5 major cotton regions, Mexico's cotton production over the next few years hinges more on what happens to water than on almost anything else. Water shortages in these regions will probably keep the 1957 crop from rising much above that produced in 1956.

The one bright spot is the development of new lands along the West Coast, where water supplies are ample now and where prospects for their continuance are highly favorable.

Costs. --Costs of irrigation water vary tremendously. Most farmers using gravity water pay from \$3.00 to \$5.00 per acre annually according to the financial status of the irrigation district. In areas where government wells supplement gravity water supplies, costs may range from \$7.50 to \$17.50 per acre. In areas totally dependent on wells, costs range from \$15.00 to \$30.00 per acre according to well depth and pumping charges. Water costs most in the private developments in Laguna, which are supplied by water from deep wells.

The cost of water in the large federal districts also varies with the original cost of the project. Most costs are figured on the basis of amortizing the original cost of the project over a 10 or 12 year period. Many of the older projects have already been paid off, and several of the more important ones are nearing final liquidation. As the old projects are paid off, more capital becomes available for the development of new projects.

Irrigated Lands. --Mexico has nearly 7 million acres of land under irrigation, by gravity water from the reservoirs and by water from deep wells. The area irrigated by gravity water accounts for some 5 million acres, or the greater part of the total area. Of the estimated 7 million acres now under irrigation, approximately 2 million acres are in private developments, and are supplied by water from deep wells.

The last 10 years and especially the last 5 have seen an impressive expansion and improvement of the irrigated area (see table 3). The great expansion during the last 5 years has resulted from the large federal projects. In 1950, it was estimated that less than half of the irrigated land was in federal projects. By 1956, such projects accounted for more than two-thirds of the irrigated area. Much of the irrigation added each year has involved improvement of old irrigation works. The Ministry of Hydraulic Resources estimates that in 1956 alone, land brought under irrigation and improved amounted to well over a half million acres; this fact indicates continuation of the trend to increase and improve the country's irrigated lands. Over five-sixths of this newly irrigated area has resulted from the development of large federal projects; the rest has resulted from smaller private projects and the drilling of deep wells.

It is estimated that in the last 10 years all together some 1,250,000 acres have been brought under irrigation by the development of deep wells. There are over 3,200 deep wells in the Laguna region, over 470 in Mexicali, about 380 in the Hermosillo area, more than 300 in Delicias, some 225 in the Yaqui Valley, and several hundred in other small scattered areas of Northern Mexico. The Ministry of Hydraulic Resources was responsible for drilling at least 1,000 of these

TABLE 3.--Irrigation: Estimated annual increase in area irrigated in Mexico in Federal projects, by type, 1947-56

Year	Gravity flow		Wells and pumps	Total
	Large projects	Small projects		
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
1947.....	273,774	26,568	643	300,985
1948.....	192,002	66,937	1,334	260,273
1949.....	145,999	55,704	12,051	213,754
1950.....	92,033	70,893	9,424	172,350
1951.....	110,189	45,773	16,976	172,938
1952.....	485,013	61,316	14,549	560,878
1953.....	379,595	31,302	16,803	427,700
1954.....	451,205	24,969	27,675	503,849
1955 ¹	543,620	24,710	24,710	593,040
1956 ¹	506,555	64,246	19,768	590,569
10-year total.....	3,179,985	472,418	143,933	3,796,336

¹ Estimated.

Calculated from reports of the Ministry of Hydraulic Resources.

wells to irrigate approximately 350,000 acres. The rest resulted from private development.

Irrigation Plans. --The Ministry of Hydraulic Resources has elaborate plans for the future development of Mexico's undeveloped water and land resources. The potential land area determined suitable for crop production is broken down by regions as follows:

Gulf of Mexico.....	12,923,330 acres
Pacific Coast.....	3,953,600 acres
Central (including Mesa del Norte, Coahuila, Chihuahua, and Nuevo Leon).....	<u>840,140 acres</u>
Total.....	17,717,070 acres

The Gulf Coast areas deemed suitable for future development are humid, subtropical to tropical, and subject to seasonal rainfall. This region is not considered suitable for future cotton production.

It is possible, but not likely, that some small parts of the central areas that are included in future development plans would be suitable for cotton production. In all probability these small isolated areas will be used to supplement the food supply of a rapidly growing population.

Of the areas considered suitable for agricultural development along the Pacific Coast, only 4 river valleys out of 19 distinct projects have climate and soils considered suitable for cotton production. These areas are located in the northern part of Sinaloa State. They are the valleys of the Rio

San Lorenzo, 271,810 acres; the valley of the Rio Humaya, 296,520 acres; the valley of the Rio San Sinaloa y Mocuzari, 296,520 acres; and finally the second stage of development in the El Fuerte Valley covering 170,000 acres. Another 250,000 acres in the El Fuerte Valley will be brought into production in the next few years. These areas, in a region where climatic factors are suitable to cotton, comprise a total of 1,284,850 acres, which, over the next 5, 10, or 15 years, will provide a developed land base for raising the country's cotton-production potential.

Whether or not large acreages of these developments will be devoted to cotton production will depend on two things: (1) Ability to meet domestic food requirements, and (2) the profitability of cotton in relation to the food products that will be consumed domestically or to other crops that might be grown for export. The lands considered suitable for future development, plus the lands already irrigated, total about 24 million acres. If these development plans were scheduled to be completed in a relatively short time, they would be extremely ambitious. Actually, however, they represent what the planning engineers now envision as Mexico's total area suitable for development through irrigation over a long period.

Agricultural Credit

Next to water, credit is without doubt the most important factor affecting agricultural production and growth in Mexico. For years, the Mexican banking system has followed a conservative policy in making credit available to agriculture. The banking and credit capacities of the country are small in relation to the demand upon them from agricultural sectors in the Mexican economy. Consequently, agricultural credit is hard to get and expensive. Most banking officials know, or have learned through experience, that the expansion of production and management know-how should precede increased credit availability. Otherwise, unwise expansion and financial losses will result.

The Mexican banking system, which is regulated and backed up to no small degree by the Bank of Mexico, maintains much higher reserves than those required by the Federal Reserve system in the United States. Thus the monetary base for capital expansion lacks resilience.

Agricultural credit in Mexico is provided by three main sources:

(1) Government-sponsored banks--the Banco Nacional de Crédito Ejidal, which makes credit available to the ejidatarios (the peons who own and work on the large communal holdings or ejidos), and the Banco Nacional de Crédito Agrícola y Ganadero, which provides federal credit to individual farm operators;

(2) private and State banks, the National Bank of Mexico, and the cotton firms operating in Mexico; and

(3) individuals and local merchants.

Government-sponsored banks. --The Banco Ejidal provides credit on a monthly basis to the ejidotarios in practically every important cotton region. Over 50 percent of this bank's cotton financing is concentrated in the Laguna region. For the last few years, the cotton-financing operations of the Banco Ejidal have been more satisfactory to it than many of its other financing activities, including the financing of food crops; and cotton financing has had more success in the Laguna region than anywhere else. This bank finances some 15 to 20 percent of the country's entire cotton production. It often advances up to 100 percent of production costs.

The Banco Ejidal is something more than solely a banking operation. It was formed after the revolution to fill a credit vacuum that existed after the large estates were broken up. The bank, although trying to follow sound credit policies, also fulfills somewhat of a social obligation, and depends upon appropriations from the Government either to expand credit operations or to make up any losses that may occur.

The Banco Agrícola also is a Government-sponsored bank, which makes loans to independent farmers in all segments of Mexican agriculture. This bank is an important factor, although not a major one, in the financing of cotton production. It is estimated that the Banco Agrícola finances less than 5 percent of the country's entire cotton production and usually makes loans ranging up to about 80 percent of the calculated cost of producing cotton. Both the Banco Ejidal and the Banco Agrícola perform important agricultural services through the ownership and management of cotton gins as well as the ownership and management of farm machinery pools.

Private Banks and Firms. --The private banking system--including the National Bank of Mexico and the important cotton firms operating in Mexico, both foreign and national--provides the most important sources of credit available for financing cotton production. Upward of 60 percent of the total credit requirements for cotton production comes from these sources.

The private banking system is reluctant to make long-range credit commitments to agriculture and takes only the preferred credit risks even for financing crop production. Members of the private banking system feel in general that it is the responsibility of the government to provide the long-term development financing needed for constructing wells, developing irrigation systems, and even financing heavy machinery. In this situation, cotton firms operating in Mexico had to assume the role of financier; for keen competition rules among these firms, and financing the crop is

their surest way of procuring cotton. In fact, this kind of financing is somewhat of a forward-buying operation. Even then, the cotton firms that are financing production have inadequate legal assurance of receiving the cotton they have financed, and they must depend to a large extent upon the honesty and integrity of the individuals with whom they deal. Thus the cotton firms, like the private banks, endeavor to finance the more responsible growers.

Private Individuals. --Private individuals, both local and foreign, are important in financing the Mexican cotton crop, supplying the remaining 10 to 15 percent of the total financing requirements for cotton production. Because of the reduction in cotton prices--approximately 25 percent in the last 2 years--and the expected shortage of water in 1957, outside capital now has much less interest than formerly in financing cotton production in Mexico.

Before the recent price declines, many private individuals from the United States and Mexico City were looking for investment opportunities in the cotton areas. This interest subsided greatly during 1956.

Credit Policy. --The government shapes the policy of its two agricultural banks. To stimulate production of food crops, the government banks in 1956 were restricted to making loans only for wheat and food crop production in the areas along the West Coast. As a result, the only credit available there in 1956 for cotton production was from cotton firms and the private banks, which are relatively new institutions in the West Coast region. Both these sources of production credit followed a conservative credit policy in 1956. This situation has made credit the No. 1 problem in expanding cotton production in Sonora and Sinaloa.

The relative importance of the financing agents in the different areas varies greatly. Private banks supply an unusually large proportion of production financing in the more stable producing regions such as Delicias, Laguna, and Mexicali, and a much more moderate proportion in the high-risk region of Matamoros and the recently developed West Coast region.

Credit in the West Coast region will continue to be tight over the next several years and will be the major factor determining the rate at which land will be shifted from wheat and other less profitable crops to cotton.

Interest Rates. --Interest rates on crop loans vary widely with the sources of credit, the stability of the respective producing areas, and, of course, the financial status of the borrower. Interest charged by the government banks is usually 8 to 9 percent; interest charged by private banks ranges upward from 10 to 12 percent; interest charged by the major cotton firms, individuals, and merchants averages somewhat higher than the minimum bank rates, for most of

these lenders find it necessary to obtain capital through the banking system either in Mexico or in the United States.

The independent lenders extending credit for cotton production must set up a system for checking the progress of the crop and the performance of the individual borrowers as the season develops. Frequently, these independent lenders must also provide for the purchase and sale of the principal production materials such as fertilizer and insecticides, to insure their availability when needed. Considerable cost is involved in providing these services as well as the usual counseling that goes along with the application of recommended practices. Independent lenders other than the private banks must charge high enough interest to absorb these costs. Even under the closest supervision, crop financing in most of the cotton region is relatively risky.

From a banker's standpoint, Delicias and Laguna are among the regions of greatest stability and lowest risk in Mexico. Matamoros is probably the region of highest risk. Only exceptionally good seasons can bring anything near 100-percent collections. As a rule, repayments amount to not much more than 80 to 90 percent of the total loans made for crop production in a given season, and in regions like Matamoros some carryover of indebtedness for 2, 4, and 6 years is not uncommon. Such risks naturally require high interest charges.

Tenure System

The Mexican revolution of 1911 left an indelible mark on the tenure system in the country's cotton regions. When the large estates were expropriated, they were turned over to the native peons who worked on them. These estates, now called ejidos, were deeded to the communal groups in perpetuity. However, neither the communal group itself nor its members, who are called ejidatarios, may transfer property. This creates a serious problem both in the older cities of Matamoros and Mexicali and in the newer cities like Delicias, Obregón, Los Mochis, and Hermosillo that have grown up in the newly developed areas. The cities cannot expand in area because the ejidos have them hemmed in. As a result, city real estate values have risen to fantastic levels. When certain conditions are met, Mexican law does permit the original ejido holdings to be traded for other agricultural lands, but the process is slow and cumbersome.

The ejidos comprise from 35 to 50 percent of the land area in the cotton regions of Northern Mexico. In every region, the ejidos are located in some of the best soil areas; in addition, most of the ejidos have ideal locations with respect to water. In every region, ejidos are interspersed with two other types of land ownership common to Mexico--the colonos,

or small individual tracts, and the larger privately owned farms.

The colonos are usually limited to 50 acres. Mexico's agrarian legislation permits private ownership of up to 250 acres in the irrigated areas except in the cotton regions, where the limit is set at 375 acres. However, the legal limitation on the size of private holdings does not set the ceiling on the size of farming operations. Since the law is interpreted as intending to limit the land owned by a single individual, a farm may include the multiple holdings of individual members of a family in a single farming operation. Therefore, many large farming operations range from 1,000 to 2,000 acres in size.

Mexican law still permits the expropriation of large private holdings under certain conditions. If a private owner with large holdings in an irrigated district for some reason or other fails to operate his holdings for a certain number of years, they may be formed into an ejido by any group of qualified peons.

The land tenure system has a great impact upon the country's ability to organize its productive resources and to meet its full production potential. The large number of small farms and the cumbersome management of the ejidos slow down the rate of adopting improved production practices. Although the system discourages the rapid and maximum realization of the country's production potential, it does provide a high degree of freedom for the land workers and probably in the long run contributes to political stability by giving many individuals a closer relationship to the land. Many Mexican nationals point to this system as a basic consideration in Mexican democracy.

COSTS AND RETURNS

Regional Variations

Production costs vary considerably among the various cotton regions; however, the variations between the marginal and the most efficient growers within homogeneous areas are probably much greater than those found among regions (see table 4).

Lowest per acre costs were found in Matamoros. Yields also average much lower in this region. The cost calculations for Matamoros do not, however, take adequately into consideration either the large number of marginal and submarginal producers or the risk factor. If the high percentage of marginal or submarginal producers, who just about break even or actually produce at a loss, were included in the averages, the average profits from cotton production would be much lower and the costs per pound of lint would be much higher.

TABLE 4.--Cotton and wheat: Estimated costs and returns per acre for typical production situations, by regions, 1956

Item	Unit	Matamoros	Laguna	Delicias	Mexicali	West Coast
Yield:		<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>
Cotton.....	Pound--	250.00	607.00	404.00	425.00	466.00
Wheat.....	Bushel--	--	29.70	29.70	22.30	26.80
Gross returns:						
Cotton.....	Dollar--	51.84	161.99	109.02	116.86	121.49
Wheat.....	--do---	--	61.56	64.80	51.03	52.47
Production costs: ¹						
Cotton.....	--do---	35.00	113.00	66.00	83.00	81.00
Wheat.....	--do---	--	35.64	37.26	42.12	32.39
Net returns: ²						
Cotton.....	--do---	16.84	48.99	43.02	33.86	40.49
Wheat.....	--do---	--	25.92	27.54	8.91	20.08

¹ Does not include charges for land and management.

² Returns to land and management.

In the Laguna region, per acre costs excluding the costs of land and management and interest charges are probably the highest in Mexico. However, yields obtained in this region are also high. Returns to land and management under 1956 conditions were nearly twice as high on farms following intensive production practices as they were for typical farms in the area.

Delicias appears to be one of the most stable cotton regions in Mexico. Per acre costs excluding the cost of land and management and interest charges are moderate, and average costs per unit of output are probably lower than in Laguna, Mexicali, or the West Coast area.

Production costs in Mexicali are fairly high; yields, moderately low. On the basis of the cost data obtainable for representative farming situations, average per unit production costs are probably the highest in the country.

Costs vary widely along the West Coast as they do in every other cotton region. Average per acre production costs in this region are slightly higher than in Mexicali, but lower than in Laguna. However, judging from cost comparisons between typical production situations and situations involving a high level of inputs, costs per unit are probably somewhat lower than in either Mexicali or Laguna.

The cost computations presented in table 4 are generalized estimates obtained from numerous sources. Among these sources are local producer associations; leading producers who assisted in the preparation of the generalized cost-of-production data for 1956; important firms or institutions making cotton production loans; and interviews with selected farmers and agricultural leaders. These estimates may be subject to some error, but they illustrate the two levels of

production situations found in the 5 major cotton regions.

An attempt to make detailed comparisons of costs among the various regions would be misleading. In fact, the generalized costs presented in table 4 have been constructed within each of the producing areas, and are therefore not adequate for drawing precise interregional cost comparisons. The calculations are valid for comparing the relative position of cotton versus other crops within each area only. To make interregional comparisons of cotton's competitive strength, a much more thorough analysis of costs and returns for cotton and all alternative crops would be necessary, together with an evaluation of maximum resource utilization in the respective areas. In this connection, the effect of capital, labor, management, land, and water upon economic alternatives would have to be fully assessed.

Effect of Modern Production Technology

The rapid adoption of modern cotton production technology has put Mexican cotton producers at some cost disadvantage compared with United States producers, for most production requisites must be imported from the United States. Mexican producers, however, have an advantage over United States producers in lower wages, cheaper land, and cheaper water in those cases where gravity water is available. In total, Mexican producers have a definite cost advantage.

Calculations for typical production situations in Mexico's principal cotton regions show that labor accounts for not much more than 25 to 30 percent of total production costs, excluding charges for land and management. Similar calculations for the United States show labor accounting for over 60 percent of total cash costs when harvesting is done by hand. Thus Mexican cotton production has a significant labor-cost advantage--possibly as much as 200 to 300 percent. This advantage is partly offset by the higher costs of machinery, repairs, and other production requisites such as fertilizer, seed, insecticides, credit, and the like (which in Mexico frequently range upwards of 10 percent above United States costs). In the United States, under complete mechanization, however, labor accounts for less than 15 percent of total costs, though the machinery cost is greatly increased.

Effect of Tenure System

The land ownership pattern greatly affects the efficiency of cotton production in Mexico. The large private farmers have led the way in adopting and applying scientific farming practices. The smaller independent farmers and the ejidos have found it much more difficult to put modern cotton production technology into effect, though both groups of farmers

have made considerable progress in the last decade.

Because the large independent operators have put modern cotton production techniques into practice much faster and much more completely, they have raised their cash production costs; and, having a higher percentage of their total production costs in the cash bracket, they are much more vulnerable to the cost-price squeeze than the small independent farmers or the ejidos. Costs of machinery, equipment, fertilizers, and insecticides, geared to United States cost movements, are rising at an increasing tempo. Therefore, if Mexican cotton prices were to dip abnormally below their 1956 levels--say 20 to 25 percent--some of the larger more efficient Mexican cotton producers could run into serious difficulties unless their government moved rapidly in reducing the taxes imposed on cotton exports. Two or more years of this tight cost-price squeeze operating in the Mexican cotton areas--as it is now operating in the United States--could play havoc with these producers, for they do not have the full stability that high support prices give to United States products. It is questionable whether in an adverse situation United States support-price policies would have enough indirect influence to keep Mexican cotton prices from dropping seriously.

On the other hand, with stability of prices at present or slightly higher levels, it has been extremely profitable for farmers to step up the level of their inputs. Given this price stability, the higher profits accruing from increased yields will probably maintain the trend toward increased application of modern cotton production technology.

ECONOMIC CHOICE OF ALTERNATIVE CROPS

Although Mexico produces a variety of agricultural commodities, cotton and wheat are the only crops that account for extensive acreages in the cotton regions.

Other crops grown in the cotton areas are alfalfa, corn, barley, rice, sugarcane, peanuts, flax, sesame, chickpeas, tomatoes, frijoles, chilis, melons, and a few other minor ones. In general, however, these crops usually account for less than 5 percent of the agricultural production in the cotton areas and compete with cotton and wheat for production resources only in a limited specialty-crop way. Most of these crops are limited in acreage by lack of markets, production problems, or the fact that they produce relatively low returns.

Comparison of Enterprise Returns

Some competition for productive resources does take place between cotton and wheat in all of the cotton producing areas except Matamoros. Estimates of typical costs and

returns per acre for cotton and wheat production in the major cotton producing regions show that cotton occupies a strong competitive position based on per acre returns in all areas where the two crops are grown (see table 5).

TABLE 5.--Cotton: Estimated average cost of production in Mexico and calculated returns to land and management, for typical production situations and for high level of inputs, by regions, 1956

Typical production situations						
Item	Unit	Mata- moros	Laguna	Delicias	Mexicali	West Coast
		<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>	<i>Per acre</i>
Yield.....	Pound---	250.00	607.00	404.00	425.00	466.00
Gross returns.....	Dollar--	63.09	161.99	109.02	116.86	121.49
Estimated production costs ¹	--do----	35.00	113.00	66.00	83.00	81.00
Returns to land and management.....	--do----	28.09	48.99	43.02	33.86	40.49
High level of inputs						
Yield.....	Pound---	450.00	1,012.00	658.00	680.00	800.00
Gross returns.....	Dollar--	122.28	272.14	177.05	183.11	208.64
Estimated production costs.....	--do----	75.00	186.00	118.00	135.00	146.00
Returns to land and management.....	--do----	47.28	86.14	59.05	48.11	62.64

¹ Exclusive of land, management, and interest charges.

In Laguna, in Delicias, and on the West Coast, returns per acre from cotton at 1956 price-cost relationships range from one and one-half to two times those for wheat. In Mexicali, cotton is over three times as profitable as wheat, while in Matamoros wheat is unimportant, primarily because of climatic factors.

Some of the intensive specialty crops, such as tomatoes, melons, and chili peppers, often are considerably more profitable than cotton, especially when markets are open and the supply is not excessive. These crops present risks, however, for only a slight overproduction can break the market and result in heavy losses.

Most other crops, such as corn, small grains, sugarcane, sesame, and rice, are far less profitable than cotton; in addition, market outlets are not so dependable. Sugarcane production and rice production involve heavy water requirements; so production of these crops is localized in the West Coast region where water is ample. If it were not for the fact that a large sugar mill happens to be located at Los Mochis, there would be no significant interest in producing

sugarcane in the El Fuerte Valley. But sugar yields are less than half of what they should be to insure economical production, and the prospects for increasing them are not bright. Corn, too, will offer little competition to either cotton, wheat, or other small grains, until high-yielding varieties are developed. The market for most food crops undergoes considerable fluctuation, which increases their riskiness.

Factors Affecting Economic Choice of Crops

Water Supply. -- Usually, per acre returns are the most important single factor for measuring the profitability of one crop against that of another in a country that has a limited land area in relation to the population and other productive resources. But in Mexico a comparison of per acre returns between cotton and wheat does not provide the complete answer to the extent of the competition existing between the two crops. Wheat requires less than half as much water as cotton; and in a "stretch-the-water" situation, it becomes a fairly good economic alternative to cotton at present prices and cost relationships.

Capital and Credit. -- The availability of capital must also be recognized as a factor in evaluating the competitive relationships of crops in the agricultural pattern. Production cost requirements for cotton in typical production situations are approximately twice as high as those for wheat. This fact becomes a major consideration in determining what crop shall be grown, for most Mexican farmers operate on borrowed capital and credit is always tight. Water and credit requirements for wheat production are only about one-half what they are for cotton. Therefore, if water and credit are scarce, and land is not a limiting factor, approximately twice as much wheat as cotton can be grown without greatly affecting total farm income of the region as a whole.

On highly productive farms with high levels of inputs, costs do not rise nearly so fast for intensive wheat production as for cotton production; therefore, water supplies and available credit become even more important in making the decision among alternatives even though comparative per acre returns greatly favor cotton.

Government Policies. -- The effect of government policies and programs is another important consideration in determining which crop will be grown. The Mexican Government supports wheat prices at approximately \$2.00 per bushel, in an effort to make Mexico self-sufficient in wheat production. The government, too, can indirectly influence both the flow of water and the flow of credit into commodity channels. In line with national policy, government influences in recent years have tended to favor wheat over cotton in the West Coast States of Sonora and Sinaloa. Of no small importance,

either, in analyzing the competitive position of the two crops is the export tax of 3.75 cents per pound currently imposed on cotton.

In the next few years, government policies as they affect cotton and wheat production on the West Coast may change. National requirements for wheat are currently approaching one million tons annually, and the country was able to reach self-sufficiency in wheat for the first time in 1956. Even though requirements may be expected to increase 100,000 tons a year more or less over the next few years as the Mexican diet shifts somewhat from corn to wheat, it is apparent that under present policies wheat production will increase even faster. The large areas of land brought under irrigation in Obregón and the El Fuerte Valley have provided the land base for this higher level of wheat production. As national production of wheat pushes beyond national requirements, which it is expected to do over the next few years, Mexico could conceivably become an exporter of wheat. If this happens, it is highly probable that government wheat export prices would be below current support levels, as current support levels are now considerably above world wheat export prices. Such a situation would improve the competitive relationship of cotton over wheat in the use of agricultural resources. The government would have difficulty in maintaining present wheat support prices if it had to subsidize wheat exports, and this subsidization would be in direct conflict with the export policy for cotton under which export taxes are imposed.

Other Factors. -- The relative abundance of indigenous labor is another factor affecting the economic choice of alternative crops. In the older regions of Laguna, Delicias, Matamoros, and Mexicali, where labor is much more plentiful than in the newly developing areas of the West Coast, gross returns as well as net returns per acre are of prime consideration to the economies of the respective areas as well as to the nation as a whole. In the long run, the consideration of employment opportunities for the local labor force assumes a prominent place in the determination of cropping systems.

In addition to the above factors, wheat is somewhat less of a production risk than cotton and requires considerably less managerial attention during the growing and harvesting season. In some regions such as the West Coast, this is an attractive consideration to management in influencing the choice of crops.

So, in spite of the fact that cotton occupies a strong competitive position based on gross or net returns per acre, there is considerable soundness in the practice of growing wheat as a partial alternative in many of the cotton regions. This is especially true in areas where land, as a production resource, is not so limited, where credit is not so plentiful,

where water availabilities must balance out to service an entire developed area, and where the local labor force is not so large as to cause a serious underemployment or unemployment problem.

PRICES

Since 1945 the average spot price of United States cotton has been from 15 to 41 percent above Mexican spot prices, with the exception of 1950 (see table 6). Only during the cotton crisis that the Korean War brought in 1950 did the prices of Mexican cotton rise above United States prices. The widest margins between Mexican and United States prices since prewar 1934-38 occurred during the 1955 season, when Mexican prices dropped drastically to encourage movement of the record crop into commercial channels before United States stocks were made available for export at competitive prices.

The spread between Mexican and United States delivered prices in Europe began to narrow rapidly early in 1956 after

TABLE 6.--Cotton, Middling 15/16 inch: Average spot price per pound in United States and Torreón, Mexico, average 1934-38, annual 1939-55

Year beginning August	United States ¹	Torreón, Mexico	Ratio U.S. to Mexican
	Cents	Cents	Cents
Average 1934-38.....	11.18	12.10	92.4
Annual:			
1939.....	10.09	10.45	96.6
1940.....	11.00	11.32	97.2
1941.....	18.31	14.68	124.7
1942.....	20.14	17.40	115.7
1943.....	20.65	19.60	105.4
1944.....	21.86	18.17	120.3
1945.....	25.96	19.41	133.7
1946.....	34.82	28.34	122.9
1947.....	34.58	30.08	115.0
1948.....	32.15	25.36	126.8
1949.....	31.83	25.11	126.8
1950.....	² 42.58	44.83	95.0
1951.....	39.42	30.62	128.7
1952.....	34.52	27.56	125.3
1953.....	33.55	27.70	121.1
1954.....	³ 33.88	² 27.62	122.7
1955.....	³ 34.38	⁴ 24.32	141.4

¹ 10 spot markets.

² 11-month average.

³ 14 markets.

⁴ 10-month average.

TABLE 7.--Cotton, M 1-1/32 inch: Monthly average price per pound for designated countries and markets, 1952-57

Year and month	Liverpool c.i.f. prices			Bremen c.i.f. prices		
	United States ¹	Matamoros, Mexico ²	Ratio U. S. to Mexican	United States ¹	Matamoros, Mexico ²	Ratio U. S. to Mexican
	Cents	Cents	Cents	Cents	Cents	Cents
1952.....	40.74	39.29	103.7	--	--	--
1953.....	39.43	--	--	--	--	--
1954.....	40.67	38.84	104.7	--	--	--
1955:						
January.....	40.99	39.85	102.9	--	--	--
February.....	41.24	39.74	103.8	--	--	--
March.....	40.97	38.38	106.7	--	--	--
April.....	40.79	37.94	107.5	--	--	--
May.....	42.06	38.37	109.6	--	--	--
June.....	42.28	38.37	110.2	--	--	--
July.....	40.83	37.39	109.2	--	--	--
August.....	40.60	36.90	110.0	--	--	--
September.....	39.95	35.34	113.0	--	--	--
October.....	40.61	34.37	118.2	--	--	--
November.....	41.24	34.71	118.8	--	--	--
December.....	39.87	31.74	125.6	40.07	32.03	125.1
1956:						
January.....	39.92	32.58	122.5	40.50	33.40	121.3
February.....	40.19	35.57	113.0	41.43	36.33	114.0
March.....	40.53	36.42	111.3	41.78	37.11	112.6
April.....	38.83	35.46	109.5	41.98	37.12	113.1
May.....	33.10	32.64	101.4	42.36	37.43	113.2
June.....	31.09	31.09	100.0	43.09	34.12	126.3
July.....	30.17	29.99	100.6	37.21	33.04	112.6
August.....	29.82	29.44	101.3	30.34	29.57	102.6
September.....	29.44	29.64	99.3	29.48	29.98	98.3
October.....	30.09	30.10	100.0	30.15	31.25	96.5
November.....	31.10	31.24	99.6	31.24	32.08	97.4
December.....	31.91	32.42	98.4	31.76	33.36	95.2
1957:						
January.....	31.28	31.87	98.1	31.48	33.22	94.8
February.....	31.09	33.23	93.6	31.57	33.17	95.2
March.....						

¹ Beginning 1952 through November 1955, Memphis Territory, SM 1-1/16".

² Beginning 1952 through November 1955, Matamoros, SM 1-1/32".

ICAC Bulletin, January 1957; World Cotton Statistics, Vol. 9, Nov. 3, 1956; Dudley Windel, Liverpool; Bremen Cotton Exchange.

the United States initiated its policy of selling cotton for export at competitive prices (see table 7). After August 1956, Mexican cotton delivered to Bremen and Liverpool actually moved at prices slightly above those for comparable grades and staples of United States cotton, thus reversing the price relationship that had prevailed for a number of years.

Until the last year or so, Mexican cotton normally sold at

a slight discount below the price of comparable United States cotton. Because both sold for dollars, Mexican exporters generally used this method of persuading foreign buyers to take Mexican instead of United States cotton. Recent comparisons of quality characteristics, however, show Mexican cotton to be fully comparable with United States cotton in spinning quality. Now that foreign spinners have gained experience with Mexican cotton, there is little reason to believe that discounts will be required to move Mexican cotton in competition with comparable U. S. growths. If discounts do become necessary again to encourage foreign sales in the future, they will probably be used because of factors other than spinning quality per se.

EXPORTS

As cotton production increased, this crop rose to first place among Mexico's export commodities, accounting for over \$200 million in 1954 and approximately \$300 million in 1955, or approximately one-fourth of the country's total foreign exchange earnings. In volume, cotton exports increased from 105,000 bales in 1934-38 to 360,000 bales in 1947-48 and to a peak of 1.9 million bales in 1955-56 (see table 8). Exports in 1956-57 will fall back to about 1,250,000 bales, and future exports will not rise much above this figure until West Coast production expansion raises national production. Nevertheless, the volume of exports will remain high enough for cotton to hold its No. 1 position as an export commodity and rank second only to tourism as a source of foreign exchange earnings. The Mexican Government fully recognizes cotton's important position, and cotton policy will undoubtedly continue to receive top priority at high official levels. It is reasonable to assume that the Mexican Government will do everything possible to solidify the gains achieved in the past as the basis for future progress.

Government Export Programs

To stimulate cotton exports in 1956, the Mexican Government employed several types of trade stimulants. It entered into a barter agreement with Western Germany to exchange cotton for artificial fiber. It made other barter agreements with Argentina, Spain, Italy, and the United States, covering a wide variety of products. Mexico also has a clearing agreement between its Banco Comercio Exterior and a group of French banks, calling for the import of French commodities (including rayon staple fiber) and the export of Mexican products, principally cotton.

A program of "compensatory exchange" was set up in

TABLE 8.--Cotton: Production, consumption, and exports in Mexico, average 1934-38, annual 1939-56

Year beginning August	Production	Domestic consumption	Production less consumption	Exports
	1,000 bales ¹	1,000 bales ¹	1,000 bales ¹	1,000 bales ¹
Average 1934-38.....	317	² 240	77	105
Annual:				
1939.....	312	(³)	--	26
1940.....	302	(³)	--	36
1941.....	375	(³)	--	25
1942.....	458	(³)	--	26
1943.....	515	(³)	--	31
1944.....	472	(³)	--	125
1945.....	434	323	111	263
1946.....	460	248	212	204
1947.....	484	288	196	359
1948.....	570	239	331	232
1949.....	937	310	627	655
1950.....	1,151	330	821	742
1951.....	1,273	325	948	972
1952.....	1,250	320	930	992
1953.....	1,210	330	880	951
1954.....	1,780	420	1,360	1,253
1955 ⁴	2,251	424	1,827	1,937
1956 ⁴	1,712	458	1,254	1,250

¹ 1934-45, bales of 478 pounds; 1946 to date, bales of 480 pounds.

² Estimated.

³ Not available.

⁴ Preliminary.

1956 to exchange cotton for products subject to import licensing. Auto parts and trucks were the principal American-made items affected by this policy. Under this program, an importer could obtain an import permit provided he showed evidence of an equivalent value of cotton being exported within 6 months to any country except Japan.

It is difficult to assess the effectiveness of these barter agreements in encouraging cotton sales, but the "compensatory exchange" program probably had little importance in moving the 1956 crop. Not only has the generally high quality of the Mexican crop achieved a good reputation in Western Europe and Japan, but in late 1956 the foreign demand for Mexican cotton actually tended to outrun supplies available for export. Obviously, the value of the dollar import items enumerated in this program was far less than the total dollar earnings of cotton; thus, the system was of doubtful usefulness. Moreover, the tourist industry and the braceros crossing the border to work in the United States are such

great dollar earners that the country has not been in a short dollar position for years.

The "compensatory exchange" program of tying United States imports to guaranteed cotton exports, which was a retaliatory measure of sorts, could conceivably backfire on its advocates. It could be the beginning of a trend toward bilateral trade. Foreign purchasers of Mexican cotton might insist in the future that their cotton imports be conditioned on Mexico's willingness to accept certain specified products as repayment. This type of barter would seriously threaten the efficient merchandising of Mexican cotton.

Export Taxes

Mexico, along with many other cotton-producing countries such as Pakistan, India, Peru, and Egypt, imposes a tax on all cotton exported from the country. In practically all countries that have imposed cotton export taxes, cotton is far more profitable than the usual food crop alternatives, and in the past the cotton industry has been able to absorb these taxes and still remain in a profitable position. Among the reasons for imposing this kind of tax are these: (1) It is an important source of revenue to the government; (2) when cotton prices have risen rapidly, it is a handy device for diminishing cotton profits and thus preventing overexpansion of cotton production at the expense of food crops; and (3) it is a useful technique for providing raw cotton to the local textile industries at prices lower than world prices and thus encouraging an expansion of domestic industries.

Mexico, as well as the other countries resorting to this device, necessarily views cotton production from the standpoint of returns both to the cotton industry and to the government. From a revenue standpoint, cotton is an important source of income in all cotton-producing countries, especially when the taxes range from 15 to 30 percent ad valorem. In this connection, it is important to consider the income accruing to the government from such taxes as well as that accruing to producers and the industry, in evaluating the overall importance of cotton production to an individual country's economy. In Mexico, government revenues from the cotton export tax are estimated at some \$34 million dollars in 1954, \$52 million in 1955, and an estimated \$23 million in 1956.

Cotton export tax rates in Mexico since 1948 are summarized as follows:

August 3, 1948.....	Export tax of 2 percent ad valorem for ginned cotton and 10 percent for unginned cotton imposed.
---------------------	--

July 1949	Tax equivalent to 4.25 cents per pound.
August 4, 1949.....	Official valuation of cotton for export lowered, making tax 66.8 centavos (3.50 cents per pound). Taxes included basic export tax of 2 percent; surtax of 15 percent on official valuation; 2-percent tax on these taxes; 1.8-percent mercantile tax; and certain other State and municipal taxes.
October 1949.....	Tax on Mexicali cotton alone reduced to equivalent of 1.44 cents per pound.
October 19, 1950	Official valuation of cotton for export increased; tax now equivalent to 7.67 cents per pound.
February 28, 1951.....	Official valuation again increased; tax equivalent to 8.03 cents per pound.
March 8, 1951.....	Official valuation again increased; tax equivalent to 12.07 cents per pound.
July 1951.....	Tax reduced 50 percent; equivalent to approximately 6 cents per pound.
December 11, 1951.....	Official valuation increased; tax about 6.35 cents per pound.
February 29, 1952.....	Official valuation decreased; tax equivalent to 4.77 cents per pound.
January 2, 1953.....	Official valuation again decreased; tax equivalent to 4.33 cents per pound.
May 7, 1954.....	Official valuation increased following devaluation of the peso; tax 6.80 cents per pound.
July 1, 1954.....	Percentage of valuation used in computing tax lowered from 27.54 percent to 22.44 percent; tax 5.53 cents per pound.

July 8, 1955.....	Official valuation lowered; tax 5.34 cents per pound.
July 1, 1956.....	Official valuation lowered; tax 3.75 cents per pound.

Source: International Cotton Advisory Committee.

In the last year or two, while world cotton prices were declining, Mexico, like practically every other country imposing cotton export taxes, manipulated the tax rates in order to insulate domestic producers from the full impact of the external fluctuations in prices. Over the last few years, the margin of tax has been sufficiently great to reduce materially the impact of declining world cotton prices on domestic producers. Mexico is no exception. In Mexico, cotton export taxes were raised to the peak level of 12 cents a pound early in 1951 when world prices soared to fantastic levels during the Korean War. Later in 1951, taxes were reduced approximately one-half, and since then they have ranged from a high of 6.8 cents a pound in 1954 to a low of 3.75 cents a pound in 1956.

Growers without exception find the tax an onerous burden and feel that it discriminates against them. To meet anticipated lower cotton prices in 1956, the government cut the export tax from 5.3 to 3.75 cents per pound. This reduction helped growers greatly, but many complain that the reduction was not enough. The cost-price squeeze still goes on, and the growers will continue their concerted efforts to get the government to reduce this tax further. In many marginal production situations, the cotton export tax means the difference between staying in or going out of business. Its continuation, even at the reduced level of 1956, will discourage new investments in cotton production unless world prices go back to early 1955 levels.

DOMESTIC CONSUMPTION

The trend in Mexican economic development indicates that consumption of all textiles will rise over the next decade. Although rayon consumption has nearly tripled since prewar 1938, cotton will also share in this improved market. The Mexican Government's policy contributes to a strong competitive price position for cotton in the domestic industry, for the cotton export tax means that the cotton available to local mills is far cheaper than rayon staple fiber or than cotton sold for export to foreign mills.

The textile industry in Mexico dates from the 16th century; in its modern form it began about 1830. In 1952 it ranked first among Mexican industries in number of workers employed, value of output, and quantity of home-produced raw material consumed.

As the following figures show, the numbers of installed spindles and looms have changed little from 1938 to 1955:

	<i>Spindles</i>	<i>Looms</i>
1938.....	910,174	36,577
1948.....	1,066,410	37,364
1953.....	1,112,375	37,500
1954.....	1,078,000	36,000
1955.....	1,100,000	37,500

Recent shifts in the industry indicate a trend toward modernization. Much of the plant capacity consists of extremely antiquated equipment; of the 270 cotton textile mills, only about 25 can be considered modern.

One of the major items produced is "manta," an unfinished cloth widely used by Mexican low-income families. Production of high quality goods is extremely limited, but has increased to some extent in the last year or so.

For a number of years, the Mexican cotton textile industry has labored under depressed conditions which under present circumstances defy an easy and permanent solution. The most important problem is the obsolescence of much of the machinery in use. Various obstacles to modernization include antiquated labor arrangements and legal requirements for the employment of more labor than is needed from an economic standpoint. A partial solution to the problem of outmoded machinery was seen in the establishment of the Toyoda de Mexico, a Japanese-Mexican textile machinery factory completed in mid-1956 at a cost of \$5,600,000; but many Mexican textile mills will probably continue to prefer machinery manufactured in the United States and Europe.

Another major problem is that of increasing the consumption of domestically produced cotton products. The government has attacked this in several ways. In June 1954 it imposed high protective tariffs--up to 100 percent ad valorem on artificially high official values--against imported cotton goods. It also subjected the foreign goods to import licensing. The combination of high tariffs and import licensing stimulated sales of local goods, since it made importation of many foreign-produced textiles prohibitive. The textile and clothing fairs held in 1955 and 1956 also promoted domestic consumption, with considerable success.

The Mexican textile industry in general has not been noted for its initiative in developing export markets. During World War II, export volume expanded fantastically; but at the same time, poor commercial practices gave the industry a bad reputation, and since the war, its exports have dwindled. In the export market for low-cost goods, Mexico cannot hope to compete with Japan and India; but it is now producing some fine goods that may be competitive in international markets. At present, however, domestic sales are at such a high level

that the Mexican cotton industry has no incentive for seeking export outlets.

The annual domestic consumption of cotton in Mexico is close to half a million bales, about twice as high as the 1934-38 level (see table 8). The greatest jump in domestic consumption has occurred since 1953. For the textile industry in Mexico, this high level represents unprecedented peacetime activity. So long as the economic prosperity of the country continues to improve, the fortunes of the industry will very likely do so also, since it is one of the few Mexican industries that depend upon the mass market for their major outlet.

The per capita textile consumption estimates by the Food and Agriculture Organization show very little overall change from prewar patterns. Total per capita availabilities of cotton, wool, and rayon in 1954 were estimated at 7.3 pounds, the same as 1938. The availabilities of cotton per capita were down from 6.4 to less than 5.5 pounds in 1954, while the availabilities of rayon fabrics were up from 0.7 to 1.8 pounds in 1954. Wool was unchanged at 0.2 pounds per capita. However, recent increases in the domestic consumption of raw cotton indicate a sizable increase in cotton's relative position. In the last 2 years, per capita cotton availabilities have surpassed the prewar level, while rayon availabilities have leveled off at about 1.8 pounds. Active promotional efforts patterned after United States methods, plus the improving climate for general economic development, undoubtedly have boosted cotton consciousness in Mexico.